

STEM vs. STEAM vs. STREAM: What's the Difference?



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You could say STEM is evolving. Mutating, even. It has sprung another two heads, and educators are currently navigating the process of turning STEM into STEAM, or even STREAM. What does it all mean, and what are the pros and cons?

What is STEM?

STEM is an educational curriculum that combines science, technology, engineering, and math. It is meant to be a comprehensive approach; instead of teaching each subject separately, educators aim to incorporate some or all elements of STEM into each project.

Common STEM projects include things like [bridge building](#) and basic computer programming, though the opportunities are seemingly endless.

While the objectives of any particular school's STEM program may vary, two overall goals of STEM are to broaden STEM literacy and participation, particularly among young women and people of color, as well as to strengthen the STEM workforce by increasing the number of students who pursue a career in a related field.

President Obama was a particular advocate for the advancement of STEM education, saying that American students must “move from the middle to the top of the pack in science and math.”

What is STEAM?

STEAM incorporates all the elements of STEM, but adds art to the mix. Examples of common STEAM projects include [growing crystal gardens](#) and [creating seed necklaces](#). These projects are science-based, but also incorporate artistic expression.

What is STREAM?

STREAM adds one more layer to STEM and STEAM: reading and wRiting. Advocates of STREAM see literacy as an essential part of a well-rounded curriculum, as it requires critical thinking as well as creativity. STREAM projects are similar to STEM or STEAM, but fold in the components of reading and writing.

The Pros of Expanding to STEAM and STREAM

Dr. Azi Jamalian, head of education strategy at [littleBits](#), sees the value in a more robust curriculum that includes reading and arts. “Every kid needs to have technology literacy and problem-solving skills,” she says. “These are key to creating their own inventions, whether it’s a device to assist someone with a disability, an arcade game, or a new household gadget.”

To Jamalian, STREAM has the potential to be more approachable and inclusive than STEM. “Incorporating design, art, and reading into STEM is a way for anyone, regardless of their technical ability, to be exposed to STREAM in a highly impactful and engaging way,” she says. “It should be accessible to everyone no matter what their background, gender, or comfort level with technology is.”

“I think very few people really understand why the arts should be included in STEM,” says Adam Cole, a musician and educator who has designed arts curricula for the State of Georgia’s Department of Education. “Those who think of the arts as a luxury, or an extra, or a break, seem to have no clue at all what their academic value is, in spite of all the research. Meanwhile, those who teach and promote the arts often seem at a loss to explain in detail how it has anything at all to do with science, technology, engineering or math.”

However, “musicians (and other artists) are learning to think like scientists,” he says, “but in a way that is aesthetically pleasing and which builds community. All the powers of the arts which are touted by everyone can be seen as contributing to one’s ability to think and reason at the highest level in a setting which is enjoyable and life-fulfilling.”

The Cons of STEAMing or STREAMing

Not everyone is convinced that adding an A or R to STEM is beneficial. In fact, some see it as a dilution of STEM’s focus and objectives.

Mark Kantrowitz, who serves on the board of trustees of the [Center for Excellence in Education](#) (CEE), which operates some of the nation’s leading STEM programs, cautions against the expansion to STEAM and STREAM.

“While it is beneficial for STEM students to have exposure to the arts and to know how to communicate,” he says, “the people pushing STEAM and STREAM are usually external to the STEM community. Their goal is not to promote STEM education, but to increase focus on the arts and reading.”

Kantrowitz echoes President Obama in his support for a more traditional STEM approach: “The U.S. does not do enough to promote and improve STEM education,” he says. “Research and problem-solving skills are not part of the secondary school curriculum. If the U.S. wants to remain the best in the world, we have to invest more in our greatest asset, which is our students. Native ingenuity is not enough.”

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